

The Impact of Banking Infrastructure on Gross Regional Product

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Abstract. When making management decisions at any level, high-quality feedback is needed, which allows you to evaluate the results of a particular impact on the control object. To assess such an impact, various models are often used, primarily economic-mathematical ones, which allow you to quickly and cost-effectively take the necessary measurements. At the regional level, one of the key indicators characterizing the state of the regional economy is gross regional product. According to its dynamics, we can draw conclusions about the success of economic management at this stage. For this reason, it is important to understand what impacts on which factors will accelerate the growth of gross regional product, which will allow us to develop recommendations for new management decisions. In the framework of this study, the hypothesis was tested whether the gross regional product depends on the level of penetration of banking infrastructure in the regional economy. To test this hypothesis, we used data from Rosstat and the Central Bank of Russia for 2017 in a regional context. In the course of the correlation analysis, the presence of a statistical relationship between the parameters was confirmed; in the course of the regression analysis, the form of dependence and its quantitative parameters were determined. The resulting model allows you to adjust managerial impact on the regional economy.

1. Introduction

In Russia, a model of economic growth has been formed based on the transformation of excess oil and gas revenues (which from 2000 to 2013 exceeded 2 trillion rubles into domestic demand. The model ensured rapid production growth, a record increase in wages in all sectors and social transfers, as well as increased macroeconomic stability. However, business strategies turned out to be aimed at expanding production, and increasing efficiency did not become a priority. The measures discussed or implemented today do not correspond to the scale of the problems facing the Russian economy. For the most part, they propose to somehow expand domestic demand, which will extend the effect of the old growth model only for a short period of time, but will not help create a new growth model [1]. The

limited export-commodity scenario of economic growth poses a challenge for the Russian economy related to the reorientation of economic entities to an innovative development model (the so-called knowledge economy. One of the options for implementing such a development model is to optimize and increase the efficiency of the process of redistributing financial resources used in value-added chains of goods and services of high-tech and high-tech industries. Managing economic growth in the context of the establishment of a knowledge economy is impossible without understanding the factors affecting the functioning of the economic system not only at the country level, but also at the regional level [2]. Stable banking sector activity is one of the conditions for maintaining the economic growth rate and improving the living standards of the population, since the successful economic development of the region largely depends on the efficient use of financial resources. It is banks that contribute to creating a resource base for the implementation of infrastructure and social projects and providing the regional economy with cash [3].

2. Literature review

The relationship between the banking system and economic growth was first studied by J. Schumpeter, according to which the function of banks as financial intermediaries stimulates the economy to develop through the effective redistribution of capital. According to Levine and King, according to 80 countries, there is a positive impact of banks on economic growth [4].

In a study of 10 European countries for 2006-2012. it was proved that domestic loans did not affect inflation, but had an impact on economic growth [5].

Empirical findings from a study in South Africa between 1980 and 2012 show that there is a positive relationship between banking financial development and economic growth in South Africa. The results, however, do not find any connection between market financial development and economic growth in South Africa [6].

A study of the impact of domestic bank loans on Nigeria's economic growth over the period from 1980-2013. revealed a poor long-term relationship between bank lending and gross domestic product in Nigeria. The authors recommend the development of policies that will enhance the bi-directional flow of influence between the banking sector, which receives investment funds, and the real sector of the economy [7].

Based on data from 101 developed and developing countries from 1970 to 2010, it was shown that the impact of financial development on economic growth depends on the growth of private lending relative to the growth of real production. The results also suggest that the effect of financial development on growth becomes negative if there is a rapid increase in private lending, not accompanied by an increase in real output [8]. In support of the above, one can cite a study that examined the relationship between financial development and economic growth in a group of 52 countries with an average income for the period 1980-2008. It was concluded that too much finance could have a negative effect on growth in middle-income countries [9]. Cecchetti, S. G., & Kharroubi, E. revealed a negative relationship between the growth rate of the financial sector and the growth rate of factor productivity [10].

A study of the role of financial development in economic growth in the former communist countries of Central and Eastern Europe and the Commonwealth of Independent States during the first two decades from the beginning of the transition period revealed that the performance and competitiveness of the financial market are more important than market size in terms of stimulating economic growth [11]. To show that, in accordance with this theory, financial growth disproportionately harms financially dependent and knowledge-intensive industries.

A study of the characteristics of the banking and financial sector in ten new EU members and an analysis of the relationship between financial development and economic growth in these countries during the period 1994-2007 led to the conclusion that the stock and credit markets in these countries are still underdeveloped and that their contribution to economic growth is limited due to the lack of financial depth [12].

Luc Laeven, Ross Levine, and Stelios Michalopoulos argue that financiers are also involved in an expensive, risky, and potentially profitable innovation process: financiers can devise more effective entrepreneurship screening processes. However, each verification process becomes less effective as technology advances. Thus, the model predicts that technological innovation and economic growth will eventually cease if financiers do not introduce innovations to improve screening [13].

An analysis of the relationship between the gross domestic product indicator and the most important indicators to assess the activities of the Russian banking sector for the period 2005–2015 revealed that the strongest positive relationship between gross domestic product and the aggregate value of banking risks, as well as profit of profitable credit institutions, the relationship between gross domestic product and the aggregate financial result of the banking sector is weaker, return on equity does not have a significant relationship with the most important indicators of banking activity, with the exception of moderate negative correlation with the total amount of regulatory capital, the negative impact on the ROE of the Russian banking sector t subordinated debt in the capital structure [14].

3. Problem statement

This work explores the impact of penetration of banking infrastructure in the region's economy on gross regional product. As the information base of the study, the data of the Federal State Statistics Service and the Central Bank of Russia for 2017 were used. in 86 regions of the Russian Federation. The gross regional product belongs to the studied indicators, the following indicators were also taken that characterize the degree of penetration of banking infrastructure in the region's economy: the number of credit organizations, the number of branches of credit organizations, the number of internal structural divisions of credit organizations.

The hypothesis of this study is the thesis that the economic growth of a region depends on the degree of provision of the region with banking infrastructure.

To test the hypothesis, we use the method of correlation and regression analysis. Using this method, we check the presence of a dependency and determine the form of this dependence.

4. Theoretical part

Economic growth is understood as a long-term tendency to increase the main macroeconomic indicator - real gross domestic product (GDP). Economic growth is the single most important indicator of a country's economic success over a long period. The factors of economic growth traditionally include labor, natural resources, physical capital, technology. Recently, the level of development of the banking sector as a part of the financial system that provides loans to the real sector of the economy with financial resources has been highlighted [15]. The banking sector is an integral part of the economic system of the region and largely reflects the main trends of its development in modern conditions [16]. Regional banks are becoming the backbone of the socio-economic development of the territory, since they are closely woven into the current system of harmonizing the interests of business, banks and the state. The advantage of a regional bank is efficiency in resolving most issues of investment lending, since it is located in close proximity to the real sector of the regional economy and is able to solve problems most competently at the local level [17]. Activation of the investment process at the expense of the banking sector resources is an urgent problem of the economic development of the country and its regions, especially in conditions of recession and a reduction in government investment - the main source of economic growth in Russia. The higher level of development of regional banking systems over the past decade has not been accompanied by an acceleration of the economic growth rates of the country's regions, which may be explained by the gap between the financial and real sectors. The modern economy is characterized by a situation where financial transactions are increasingly detached from commodity production and trade, developing autonomously, and credit institutions, guided by the goals of preserving liquidity and reducing credit risks, do not always really assess investment demand and credit potential for financing it [18]. Among the possible reasons for the lack of a statistically significant relationship between the lending activities of commercial banks and the economic growth rates in the regions in the short term, the following can

be noted. Firstly, there is a certain time lag between the moment a loan is granted by a commercial bank and the effect that the use of credit funds has on the activities of the borrower. It can be assumed that when analyzing longer periods, the effect of the activities of commercial banks will be more pronounced for regional economic development [19].

The different degree of participation of the banking sector in the economy of foreign countries is due to different conditions for the formation and development of interaction between the banking and real sectors, methods of regulation and management of this process, as well as the potential and capabilities of the sectors themselves. The most significant contribution to the development of the economy was made by European banks (250–500% of GDP [20]).

5. Results

In the framework of this study, the goal was to investigate how the gross regional product depends on the security of the region with banking institutions and organizations. The hypothesis was formulated that the stronger the penetration of credit institutions in the economy of the region, the more represented the banking departments in the regional market, the better the conditions for the development of economic activity and, consequently, for the growth of gross regional product.

The research information base is compiled by the data of Rosstat and the Central Bank of Russia for 2017, which are grouped by federal subjects and include the following data:

1 gross regional product by constituent entities of the Russian Federation (gross value added at basic prices, million rubles. - Y;

2 the number of credit organizations in the region, pcs. - X1;

3 the number of branches of credit organizations in the region, pcs. - X2;

4 the number of internal structural units of credit organizations in the region, pcs. - X3.

The process of forming an economic-mathematical model goes through several stages. At the first stage, we analyze the pair correlation coefficients. This allows us to exclude from further analysis those parameters that do not have a significant relationship with other parameters. Due to this, it is possible to reduce the complexity of the subsequent analysis and improve the quality of the results.

In our study, the obtained pair correlation coefficients allow us to conclude that all the parameters included in the sample are closely related to each other; there is no need to exclude anyone from the model.

At the second stage of the study, we will conduct a regression analysis that allows us to determine the quantitative parameters of the dependence model. The gross regional product acts as the resulting feature, and other indicators as factor features. Received the following regression equation:

$$Y = -9\,075.08 + 38\,983.19 * X1 + 1\,377.97 * X2 + 1,593.48 * X3$$

Assessment by the criteria of Student and Fisher allows us to accept the model as significant, describing a close relationship.

The coefficient of multiple determination, equal to 0.93, shows that the traits included in the model determine the variability of the resulting trait by 93%.

All factor attributes included in the model positively affect the resulting attribute. However, the establishment of new credit organizations now seems to be a very complicated and costly process, which is hardly solved at the regional level. But stimulating credit organizations to create branches and especially internal structural units in the region is a perfectly acceptable way of stimulating the growth of gross regional product.

$$\phi_k(\vec{r}) = (2\pi)^{2/3} \exp(i\vec{k} \cdot \vec{r}) \quad (1)$$

$$A^{(3/2)} = A^{(+)} - A^{(-)} \quad (I = \frac{3}{2}) \quad (2)$$

6. Conclusion

Thus, we can conclude that the depth of penetration of banking infrastructure in the region's economy has a positive effect on the growth of gross regional product, and it is advisable to stimulate the

opening of points of presence of credit organizations in the territory of presence at the level of regional authorities.

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